

# Operative shortening of the sling as a second-line treatment after TVT failure

Artur Gibas, Marcin Matuszewski, Jerzy Michajłowski, Kazimierz Krajka

Department of Urology Medical University of Gdańsk, Poland

## KEY WORDS

female ▶ stress urinary incontinence ▶ mid-urethral sling ▶ TVT failure

## ABSTRACT

**Introduction.** Stress urinary incontinence (SUI) is defined as an involuntary loss of urine during physical exertion, sneezing, coughing, laughing, or other activities that put pressure on the bladder. In some cases, recurrent or persistent SUI after sling operations may be caused by too loose placement of the sling. In the current study, we describe our method of shortening of the sling as a second-line treatment of tension-free vaginal tape (TVT) failure.

**Materials and methods.** Four women, aged 46-61, after initial TVT operation were treated for persistent SUI. The severity of SUI was estimated by: physical examinations, cough tests, 24-h pad tests, and King's Health Questionnaire. The shortening procedure, based on excising the fragment of tape and suturing it back, was performed in all patients.

**Results.** All cases achieved a good result, which was defined as restoration of full continence. No complications occurred. The 12-month follow-up showed no side-effects. The postoperative control tests: the cough and 24-h pad tests were negative in all women. The general health perceptions increased after the shortening procedure by a mean value 44.25%. The incontinence impact decreased by a mean value 44.6%. In all patients, role and physical limitations significantly decreased (by 88.5% and 80.5%, respectively). The negative emotions connected with SUI significantly decreased after the second procedure.

**Conclusions.** The operative shortening of the implanted sling is a simple, cheap, and effective method of second-line treatment in cases of TVT failure and may be offered to the majority of patients with insufficient urethral support after the first procedure.

## INTRODUCTION

Stress urinary incontinence (SUI) is defined as an involuntary loss of urine during physical exertion, sneezing, coughing, laughing, or other activities that put pressure on the bladder [1]. Numerous studies have shown that urinary incontinent patients have lower health-related quality of life (HRQoL) compared to the healthy population or to controls [2-5]. Symptoms of SUI can cause great discomfort, embarrassment, and loss of self-confidence that can lead to withdrawal from social, occupational, domestic, physical, and sexual aspects of life. Daily activities including hobbies, household work, and physical recreation can often be limited to areas around the location of toilets to avoid potentially embarrassing situations.

SUI is classified depending on the underlying etiology, with either loss of urethral support (type I), urethral hypermobility (type II), or intrinsic sphincter deficiency (type III) being the main causative factor [6].

There are many conservative and interventional therapeutic options in SUI. As far as surgery is concerned, mid-urethral polypropylene slings (MPS) introduced under the central part of the urethra in order to restore its weakened support have become the most popular treatment of SUI in females over the last two decades [7].

Long-term results of MPS reported in the literature are generally good. Complications such as erosion, tape misplacement, *de novo* detrusor instability, too high tension of the sling, or its improper placement are rather rare. The general success rate reported may be as high as 71% with five-year observation [8]. The outcome depends on surgical technique, patient's age, concurrent pelvic organ prolapse, intrinsic sphincter deficiency, neuromuscular properties of the patient's tissue, tape material, as well as medical conditions such as diabetes, obesity, and obstructive pulmonary disease [9-16].

We know that in some cases recurrent or persistent SUI after sling operations may be caused by too loose placement of the sling providing insufficient support for the urethra.

In the current study, we describe our novel method of shortening of the sling as a second-line treatment of TVT failure.

## OBJECTIVES

The aim of the study is to present the outcome of the novel operative technique of shortening of the midurethral polypropylene sling in patients with unsatisfactory result of the previous TVT installation.

## MATERIAL AND METHODS

The study group consisted of 4 women, aged 46-61, who had undergone TVT procedures performed according to the manufacturer's guidelines, but resulted in persistent urinary incontinence.

Initial sling placements were performed 4-, 11-, 3-, and 8 months before admission to our unit.

Before undertaking the second-line treatment all patients had been examined to investigate other possible causes of TVT failure. Urinalysis and urinary culture as well as urodynamic and transvaginal ultrasonography were performed. Thus, infection, detrusor instability, and sling misplacement were excluded. All patients had type I incontinence with minor urethral hypermobility. After urodynamics, which were performed before the second-line treatment, we state that all of our patients failed the first procedure due to inadequate support of the urethra. Detrusor instability was excluded (Tab. 1). All patients were classified as type I stress urinary incontinence according to Blaivas criteria [17].

Then, as the sub-optimal urethral support was detected to be the cause of the TVT failure, all patients were qualified for the second-line operation.

Patients qualified for the study underwent the following functional tests to estimate the preoperative and postoperative con-

**Table 1.** Results of urodynamics after the TVT failure

Patient No.	Bladder volume (ml)	Detrusor instability	VLPP (cm H <sub>2</sub> O) (Valsalva leak point pressure)	CLPP (cm H <sub>2</sub> O) (Cough leak point pressure)
No. 1	359	Excluded	72	86
No. 2	267	Excluded	68	85
No. 3	214	Excluded	87	103
No. 4	306	Excluded	94	105

tinence: physical examinations, cough tests, 24-h pad tests, and quality of life questionnaires – King's Health Questionnaire (KHQ) preoperatively and 12 months after the second procedure.

The KHQ was scored according to the developers' instructions. The minimum possible score is 0 (best health) and the maximum possible score is 100 (worst health) [18].

The preoperative 24-h pad tests confirmed insufficient results (median result after the first failure procedure was 288.0 g) of the previous TVT installation in all cases. In all women the preoperative cough tests were positive.

The procedure was done in the lithotomy position under spinal anesthesia. After the incision of the anterior vaginal wall, the fragment of sling was exposed and a 5–8 mm fragment of it was excised (urethrolisis was not performed). The remaining ends of the tape after excision were mobilized only enough to make the re-anastomosis possible. We used a non-absorbable suture 2-0 to perform the re-anastomosis, which created more adequate support for the urethra. The small incision in the anterior vaginal wall was closed with interrupted sutures (Caprosyn 3-0). After the procedure, an 18 F Foley catheter was inserted for one day (Fig. 1).

## RESULTS

All patients were operated on in the above-presented manner. The mean time of surgery was 36 minutes (range 30 to 45). Neither blood loss nor any other complication occurred and patients were discharged the next morning. Spontaneous voiding with minimal (less than 50 ml) post-void residual urine (PVR) was found in all patients before discharging home and on follow-up visits (range 11–13 months) and it did not increase. Patients did not complain of any problems with emptying their bladders.

The follow-up showed no side effects related to the used method or any de novo urgency or obstructive symptoms.

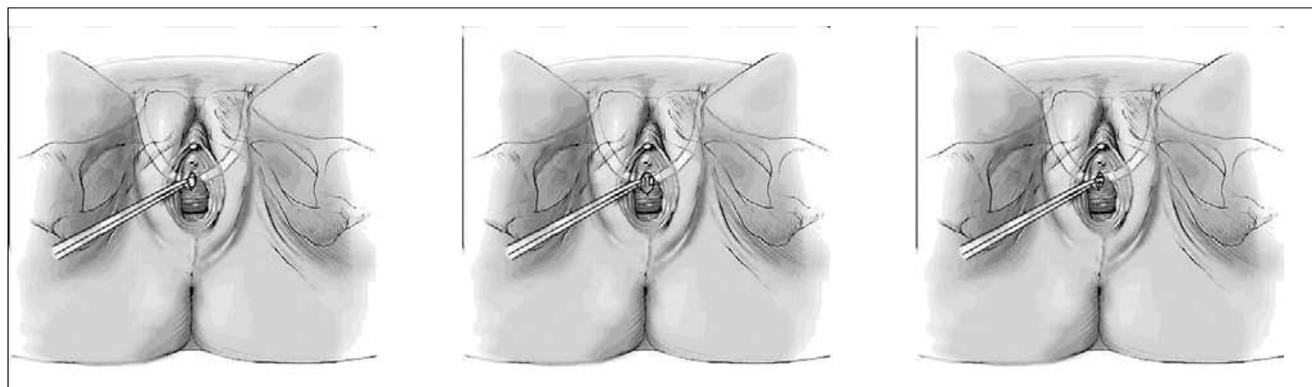
All cases achieved a good result, defined as restoration of full continence. It meant that the cough and 24-h pad tests (<5.0 g) were negative and patients estimated their continence as good. All patients were classified as stage I in the Pelvic Organ Prolapse Quantification (POPQ) scale [19].

The general health perceptions measured after 12-month follow-up by King's Health Questionnaire increased after the second procedure by a mean value of 44.25%. Incontinence impact decreased by mean value 44.6%. In all patients, role and physical limitations significantly decreased (respectively by mean value 88.5% and 80.5%). In all women, personal relationships before and after the second operation were good. All of them were supported by their partners during their problems and treatments. The negative emotions connected with SUI significantly decreased after the sling shortening procedure. Preoperatively in all women we evaluated emotions higher than 67/100 points. In follow-up, three women estimated negative emotions on the zero level and only one woman on the level 11/100 points. Severity measures after the second operation significantly decreased by a mean value of 81.2%. None of the patients needed to wear the pads or change underwear. Moreover, all women stopped limiting fluid intake.

## DISCUSSION

Surgical treatment of SUI using the supra-pubic tension-free vaginal tape was first introduced in 1995 by Ulmsten and Petros. It is based on restoring sufficient support to the urethra, which is believed to be the principal factor causing SUI [7]. In the following years, several pubovaginal or transobturator polypropylene sling systems have been developed and have gained acceptance due to good results and rather low complication rates. Irrespectively of the system used, the long-term failure rate of the treatment is about 30% after 5-years follow-up [8]. Meaning that because of a very large number of performed procedures, a lot of patients may suffer from persistent or recurrent SUI after the operation. Incontinence after TVT can be caused by many factors like: detrusor instability, infection, vesico-vaginal fistula, or over-flow leakage, but one of the most common causes is less than optimal support by the sling on the urethra.

In the literature, management of recurrent SUI starts with the exclusion of possible concomitant factors and is usually based on insertion of the second sling. It should rather be the pubovaginal sling system, as there are two studies indicating that this approach



**Fig. 1.** Operative shortening of the sling. Step 1: (left image) – incision of the anterior vaginal wall and preparation of the sling. Step 2: (middle image) – excision of a small fragment of the sling. Step 3: (right image) – re-anastomosing both ends of the sling by non-absorbable suture (two interrupted sutures).

has a higher cure rate than the transobturator one in repeat mid-urethral sling cases [20, 21]. However we know that it is not always a successful treatment. Stav et al. compared the outcome of TVT between primary and repeated surgeries and found that repeated procedures had a significantly lower cure rate than primary ones (31% vs. 13%,  $p < 0.001$ ) so repeated TVT may lead to the frustrating situation where the patient has two slings installed and still leaks [20].

Thus other methods based on repairing the sling may appear to be an attractive option. Lo et al. in 2006 described a simple method of shortening the TVT tape using figure-eight sutures to treat the recurrent SUI. In their series of 14 patients with recurrent SUI, 10 women had been cured (71.4%) with this procedure [22]. Villet et al reported a transvaginal sling shortening with midline sling plication using 4-zero polypropylene suture for re-tensioning the loosened sling on one patient after an unsuccessful TVT procedure. The surgical results were good and no complications were observed [23]. Neuman reported successful elimination of SUI symptoms in four patients who underwent a similar procedure with non-absorbable No. 0 nylon suture [24].

Our concept is based on removing the part of the tape and shortening it by re-anastomosing its ends with nonabsorbable sutures. The length of the fragment to be excised was decided according to the surgeon's experience in order to obtain adequate support of the urethra. In future studies it may be possible to correlate the length of the removed fragment with the result of second line treatment and to use this data to plan preoperatively the length of removed tape according to the severity of incontinence. The technique is very simple, cheap, and proven to be very effective in restoring continence and improving patients' quality of life.

## CONCLUSION

The operative shortening of the sling is a very simple, cheap, and effective method for second-line treatment in cases of TVT failure and, in our opinion, may be offered to the majority of patients with insufficient urethral support after the first procedure. However, long-term, prospective, randomized studies with adequate case numbers are required to verify this novel surgical method of shortening the sling and comparing it with current alternative procedures for recurrent SUI.

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## Correspondence

Artur Gibas  
 Department of Urology  
 Medical University of Gdańsk  
 1a, Kliniczna Street  
 80-402 Gdańsk  
 phone +48 58 34 93 823  
 delins@gumed.edu.pl